1. An apparatus for reshaping an optical signal, comprising:

a first input for receiving an input optical signal;

an optical reshaper, comprising:

an optical reshaper input connected to the first input for receiving the input optical signal from the first input; and

an optical reshaper output for outputting an output optical signal in response to the input optical signal;

a first output connected to the optical reshaper output for receiving the output optical signal from the optical reshaper output and outputting the output optical signal; and

where the output optical signal is the input optical signal reshaped.

2. The apparatus of claim 1, the optical reshaper further comprising a first lasing semiconductor optical amplifier (LSOA) having an input connected to the optical reshaper input for receiving the input optical signal.

3. The circuit of claim 2, the first LSOA further comprising a laser cavity.

4. The circuit of claim 3, the first LSOA further comprising an amplifying path connected to the LSOA input and passing through the laser cavity for propagating the input optical signal.

5. The circuit of claim 3, the first LSOA further comprising a pump input connected to the laser cavity for receiving a pump exceeding a lasing threshold for the laser cavity.

6. The circuit of claim 2, the first LSOA further comprising a laser output for outputting a laser output optical signal in response to the input optical signal.

7. The apparatus of claim 6, the optical reshaper further comprising a second LSOA having an input connected to the laser output of the first LSOA.

8. The apparatus of claim 7, the second LSOA further comprising a laser output for outputting a laser output optical signal in response to the laser output of the first LSOA.

9. The apparatus of claim 8, wherein the laser output of the second LSOA is connected to the optical reshaper output.

10. The apparatus of claim 2, wherein the LSOA is a vertical lasing semiconductor optical amplifier (VLSOA).

11. The apparatus of claim 2, wherein the LSOA is a transverse lasing semiconductor optical amplifier (TLSOA).

12. The apparatus of claim 2, wherein the LSOA is a longitudinal lasing semiconductor optical amplifier (LLSOA).

13. An optical reshaper for reshaping an input optical signal, comprising:

a first input for receiving the input optical signal;

an optical reshaper output for outputting an optical reshaper output signal;

a first lasing semiconductor optical amplifier (LSOA), comprising:

an input for receiving optical signals and connected to the first input; and

a laser output for outputting a first laser output optical signal in response to the received optical signals;

a second LSOA, comprising:

an input for receiving optical signals and connected to the first input; and

a laser output for outputting a second laser output optical signal in response to the received optical signals;

a third LSOA, comprising:

an input for receiving optical signals and connected to the laser output of the first LSOA and to the laser output of the second LSOA; and

a laser output connected to the optical reshaper output and to the input of the second LSOA for outputting a third laser output optical signal in response to the received optical signals; and

where the optical reshaper output signal is a reshaped input optical signal.

14. The optical reshaper of claim 13, wherein:

the optical reshaper output signal is low when the input optical signal is below a depletion threshold for the first LSOA; and

the optical reshaper output signal is high when the input optical signal is above a depletion threshold for the first LSOA.

15. The optical reshaper of claim 13, further comprising:

a second input for receiving a bias optical signal; and

a first combiner connected to the first input, the second input, the input of the first LSOA, and the input of the second LSOA for receiving the input optical signal and the bias optical signal, combining the input optical signal and the bias optical signal, and outputting the combined signal to the first LSOA and the second LSOA.

16. The optical reshaper of claim 15, wherein:

the optical reshaper output signal is low when the combined signal received a the first LSOA is below a depletion threshold for the first LSOA; and

the optical reshaper output signal is high when the combined signal received at the first LSOA is above a depletion threshold for the first LSOA.

17. The optical reshaper of claim 13, wherein the first LSOA further comprises:

a laser cavity with an optical path;

an amplifying path connected to the input and passing through the laser cavity for propagating the optical signals received at the input;

a pump input connected to the laser cavity for receiving a pump for exceeding a lasing threshold for the laser cavity; and

wherein the first LSOA laser output outputs the first laser output optical signal in response to the received optical signals propagating through the amplifying path.

18. An apparatus for recovering a clock signal from an optical input signal, comprising:

an optical AND gate, comprising:

a first input for receiving the input optical signal;

a second input for receiving a second input optical signal; and

an output for outputting an AND gate output optical signal in response to the first input optical signal and the second input optical signal, the AND gate output optical signal being a feedback signal;

a feedback controller for generating a control signal, comprising:

an input connected to the optical AND gate output for receiving the feedback signal; and

an output for outputting the control signal in response to the feedback signal;

a variable oscillator for generating a clock signal, comprising

an input connected to the feedback controller for receiving the control signal; and

an output connected to the second input of the optical AND gate for outputting the clock signal in response to the control signal; and

an output connected to the output of the variable oscillator for outputting the clock signal generated by the variable oscillator.

19. The apparatus of claim 18, wherein the clock signal generated by the variable oscillator is the clock signal recovered from the optical input signal.

20. The apparatus of claim 18, wherein the feedback controller comprises:

a detector connected to the optical AND gate output for receiving the feedback signal and detecting the received feedback signal; and

a low pass filter connected to the detector and the variable oscillator for generating the control signal in response to the feedback signal.

21. The apparatus of claim 18, wherein the variable oscillator is an optical astable multivibrator.

22. An optical retimer for retiming an input optical signal, comprising:

a first input for receiving the input optical signal;

a second input for receiving an optical clock signal;

a combiner connected to the first input and the second input for receiving the input optical signal and the optical clock signal and outputting a combined optical signal, the combined optical signal being a combination of the input optical signal and the optical clock signal;

an optical retimer output for outputting an optical retimer output signal;

a first lasing semiconductor optical amplifier (LSOA), comprising:

an input connected to the combiner for receiving optical signals; and

a laser output connected to the optical retimer output for outputting a first laser output optical signal in response to the received optical signals;

a second LSOA, comprising:

an input connected to the combiner for receiving optical signals; and

a laser output for outputting a second laser output optical signal in response to the received optical signals;

a third LSOA, comprising:

an input connected to the laser output of the first LSOA and the laser output of the second LSOA for receiving optical signals; and

a laser output connected to the input of the second LSOA for outputting a third laser output optical signal in response to the received optical signals; and

where the optical retimer output signal is a retimed input optical signal.

23. The optical retimer of claim 22, wherein the input optical signal is a reshaped optical signal.

24. The optical retimer of claim 22, wherein optical clock signal is a clock signal recovered from the input optical signal.

25. An optical apparatus, comprising:

means for reshaping an input optical signal and outputting a reshaped optical signal; and

connected to the means for reshaping the input optical signal, means for retransmitting the reshaped optical signal.

26. An optical apparatus, comprising:

an input for receiving an input optical signal;

connected to the input, means for reshaping the input optical signal and outputting a reshaped optical signal;

connected to the input, means for recovering a clock signal from the input optical signal and outputting the recovered clock signal;

connected to the means for reshaping the input optical signal and the means for recovering the clock signal, means for receiving the reshaped optical signal and the recovered clock signal, retiming the reshaped optical signal, outputting a retimed reshaped optical signal; and

connected to the means for retiming the reshaped optical signal, means for receiving the retimed reshaped optical signal and retransmitting the retimed reshaped optical signal.

27. A method for reshaping an input optical signal, using a first lasing semiconductor optical amplifier (LSOA), a second LSOA, and a third LSOA, each of the first, second, and third LSOAs comprising an input, an output, a laser cavity with an optical path, an amplifying path connected to the input and passing through the laser cavity, and a laser output, the laser output of the first LSOA being connected to the input of the third LSOA, the laser output of the second LSOA being connected to the input of the third LSOA, and the laser output of the third LSOA being connected to the input of the second LSOA, comprising the steps of:

pumping the laser cavity of the first LSOA to exceed a lasing threshold for the laser cavity;

pumping the laser cavity of the second LSOA to exceed a lasing threshold for the laser cavity;

pumping the laser cavity of the third LSOA to exceed a lasing threshold for the laser cavity;

receiving the input optical signal at the input of the first LSOA;

propagating the input optical signal along the amplifying path of the first LSOA;

in response to the input optical signals propagating along the amplifying path of the first LSOA, outputting from the laser output of the first LSOA a first laser output optical signal;

receiving the input optical signal and a third laser output signal at the input of the second LSOA;

propagating the input optical signal and the third laser output signal along the amplifying path of the second LSOA;

in response to the input optical signal and the third laser output signal propagating along the amplifying path of the second LSOA, outputting from the laser output of the second LSOA a second laser output signal;

receiving the first laser output signal and the second laser output signal at the input of the third LSOA;

propagating the first laser output signal and the second laser output signal along the amplifying path of the third LSOA;

in response to the first laser output signal and the second laser output signal propagating along the amplifying path of the second LSOA, outputting from the laser output of the second LSOA a third laser output signal; and

where the third laser output signal is the input optical signal reshaped.

28. The method of claim 27, wherein the third laser output signal is low when the input optical signal is below a depletion threshold for the first LSOA.

29. The method of claim 27, wherein the third laser output signal is high when the input optical signal is above a depletion threshold for the first LSOA.

30. A method for reshaping an input optical signal, using a first lasing semiconductor optical amplifier (LSOA), a second LSOA, and a third LSOA, each of the first, second, and third LSOAs comprising an input, an output, a laser cavity with an optical path, an amplifying path connected to the input and passing through the laser cavity, and a laser output, the laser output of the first LSOA being connected to the input of the third LSOA, the laser output of the second LSOA being connected to the input of the third LSOA, and the laser output of the third LSOA being connected to the input of the second LSOA, comprising the steps of:

receiving the input optical signal at the input of the first LSOA;

receiving a bias optical signal at the input of the first LSOA;

in response to receiving the input optical signal and the bias optical signal, outputting from the laser output of the first LSOA a first laser output optical signal;

receiving the input optical signal, the bias optical signal, and a third laser output signal at the input of the second LSOA;

in response to receiving the input optical signal, the bias optical signal, and the third laser output signal, outputting from the laser output of the second LSOA a second laser output signal;

receiving the first laser output signal and the second laser output signal at the input of the third LSOA;

in response to receiving the first laser output signal and the second laser output signal, outputting from the laser output of the second LSOA a third laser output signal; and

where the third laser output signal is the input optical signal reshaped.

31. The method of claim 30, wherein the third laser output signal is low when the input optical signal combined with the bias optical signal is below a depletion threshold for the first LSOA.

32. The method of claim 30, wherein the third laser output signal is high when the input optical signal combined with the bias optical signal is above a depletion threshold for the first LSOA.

33. A method for recovering a clock signal from an input optical signal, comprising the steps of:

receiving the input optical signal at a first input of an optical AND gate;

receiving a clock signal at a second input of the optical AND gate;

generating a feedback signal in response to the input optical signal and the clock signal;

generating a control signal in response to the feedback signal;

generating the clock signal in response to the control signal; and

where the clock signal is the clock signal recovered from the input optical signal.

34. A method for retiming an input optical signal, comprising the steps of:

receiving the input optical signal at a first input of an optical AND gate;

receiving a clock signal recovered from the input optical signal at a second input of the optical AND gate;

outputting a retimed optical signal from an output of the optical AND gate.